with the ovum, and possibly some of the vascular corium in addition; and even in *Canidæ* and *Pinnipedia* less of the decidua comes away at parturition than in the cat.

4. That the secretion of the uterine glands is absorbed by the intervillous parts of the chorion, and serves as "uterine milk or chyle," the comparison originally made by Harvey.

The important bearing of these researches on the classification of Mammalia is obvious, and they suggest scarcely less important questions as to the nutrition and respiration of the fœtus. P. S.

OUR BOOK SHELF

An Elementary Treatise on Kinematics and Kinetics. By E. T. Gross, M.A., Fellow of Gonville and Caius College, Cambridge, &c. (London: Rivingtons, 1876.)

MR. GROSS says, in his preface to the book before us, that it "is intended to contain as much as is required, under the head of Dynamics, of candidates for honours in the first three days of the mathematical tripos." This object has no doubt determined to a great extent the form which the work has taken, and we see no reason to doubt that it is well suited for the purpose mentioned, and will prove useful to students working for Cambridge examinations. The first five chapters are devoted to the Kinematics of a point, the conception of Velocity being taken up at the outset, along with that of Motion; motion as change of position, and the theorem of the instantaneous centre is only briefly mentioned in a short chapter (the sixth) chiefly devoted to the "Geometry of the Cycloid." The remaining ten chapters of the book are given to Kinetics. The author has taken great pains to put the fundamental conceptions of his subject clearly before his readers, and the parts of his book most valuable to the general student will certainly be those in which he endeavours to crystallise the vague notions too often picked up, at the commencement of a study, as to velocity, force, &c. At the same time we must say that the arrangement of the book is not such as to fit it for general purposes as an elementary text-book on its own subjects. Perhaps this was unavoidable, considering the main object with which it was written, but it is certainly to be regretted. For most purposes it seems better to commence the study of Kinematics by considering motion as change of position only, leaving velocity to be brought in later. This certainly makes it more easy for the student to realise the matter, and obviates such difficulties as occur for instance at pp. 16 and 20, where "change of velocity" means in one place a change of velocity both in direction and in magnitude, and in the other a change in magnitude only. The same treatment also would allow of portions of the Kinematics of rigid bodies being taken up in an elementary manner, while in Mr. Gross's work this part of the subject, the most important one, is practically left untouched. No motion, in fact, is considered, except the motion of a point in a plane. The treatment by the method of instantaneous centres is merely mentioned, although the development of this method certainly furnishes excellent means for the elementary treatment of the more important problems connected with the kinematics of rigid bodies. Similar remarks might be made in reference to the second part of the work, but perhaps it is not fair to criticise from this general point of view a book written chiefly for a special and limited purpose.

Mr. Gross has used geometric illustrations freely and with great advantage throughout his book. We regret that he has adhered throughout to the *parallelogram* of velocities, forces, &c. Surely it is more elegant and in every way better to use three lines than five. Culmann's science can be very little known in this country if we have not yet got even as far as this.

LETTERS TO THE EDITOR

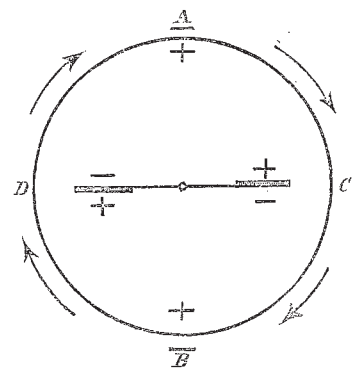
[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*]

The Direct Motion in the Radiometer an Effect of Electricity

I HASTEN to communicate to NATURE some new facts which are destined, I believe, to throw some light on the theory of the radiometer:—

1. The glass globe becomes negatively electrified upon the whole of its exterior when the instrument is submitted to solar, or even obscure heat radiations of sufficient intensity, and this electricity is more intense upon the hemisphere facing the radiant source than that opposed. It was by means of a proof-plane of large surface and a Bohnenberger's electroscope that I was able to determine the presence of this free electricity. By touching the globe several times in different places with the proof-plane, and then applying it to the electroscope, the effects are very sensible. This electricity cannot be attributed to the friction of the radiometer vanes with the rarefied air of the globe, since the electroscopic indications are not modified when the instrument is inverted, and the vanes thus prevented from moving. Neither, as several experiments show, can it be attributed to feeble evaporation on the exterior. This development of electricity upon the exterior surface of the globe is of course necessarily accompanied by the development of positive electricity upon the inner surface.

2. When exposed to radiation, the black face of the vanes is electrified positively, and the bright face negatively. This I have proved in the following manner:—I took a strip of mica two decimetres long, and having coated one of the sides with lampblack, I suspended it in a Coulomb's Torsion Balance, having previously electrified the metallic disc of the balance-needle with positive electricity. The blackened side faced the disc. I then



allowed the radiations from a gas-flame to fall upon the blackened surface of the mica strip. Notwithstanding the light was at some distance, and had to penetrate the thick glass shade inclosing the balance, the needle was rapidly repelled several degrees, showing that the blackened face was positively electrified under the influence of radiation. I then turned the strip of mica so that the bright side faced the disc and allowed the radiation to fall as before upon the blackened surface. The needle indicated an attraction between the disc and the mica, proving that the bright surface was negatively electrified.

3. To anticipate the objection that these electrical manifestations are too feeble to account for the rapid revolution of the vanes, I gently rubbed the globe with a brush composed of glass threads; the electricity developed on the globe acting by induction upon the nearest mica disc of the radiometer caused a brisk oscillation. I then measured the intensity of this electricity by means of the proof-plane and electroscope, and there were no indications of greater intensity then when the globe was electrified by radiation.

4. From the above facts the following theory, if I mistake not, necessarily flows. The radiometer is electrified as represented in the figure. At C the black face of the vane is turned towards the radiant source, and in this position the vane will be forced to move in the direction A C B; when it arrives at D, the direction of the rotation which the attractive and repulsive forces

necessarily produce will not change. It will be that indicated by the arrows, namely, B D A. The direct and ordinary movement in the radiometer is thus explained in the simplest manner.

JOSEPH DELSAULX, S. J.

11, rue des Récollets, Louvain, Belgium, July 22

A Brilliant Meteor

LAST Tuesday evening, July 25, at three minutes past 10 P.M., a magnificent meteor was observed here. Its first appearance was hidden from me by a tree, but the rest of its long course was open to view. It travelled straight from S. to N. between the directions S.S.W. and W. Its apparent size was that of Jupiter. When first seen it was of a brilliant violet colour. This changed to bright green and red, and towards the end it was, I think, green in front, red behind, and where a number of globules which broke off seemed to follow it. The body of the meteor was pear-shaped. No luminous train was left after its disappearance. The motion was much slower than that of common aërolites, and probably the phenomenon lasted about two seconds. It would be interesting to know what was seen of it in the West of England and in Ireland.

Pembroke Lodge, Richmond Park, July 28 F. A. R. RUSSELL

ON Tuesday, the 25th, I was seated with my eyes looking westward, when at 10.5 P.M. a most remarkable meteor passed before my vision, which exceeded in brilliancy of colour and in dimensions any phenomenon of the kind that I ever witnessed in the whole course of my life.

The main body of the meteor was a vivid emerald green, with a large spherical head tapering away into a tail of fiery red colour, followed up by a luminous track.

Its trajectory was almost horizontal, emanating from the constellation of Aquila, passing through that of Hercules, curving slightly downwards, and passing a few degrees beneath Arcturus; a short distance northward of that great star the meteor suddenly collapsed with a bright effulgency, and vanished from sight.

Its velocity appeared as being somewhat slower that what I have observed on similar occasions. It was present to the observer for more than five seconds of time, sufficient time to leave on the mind of the observer a distinct impression of the meteor's various aspects.

Owing to the dry condition of the atmosphere, the apparent proximity of the meteor was very striking; the brilliant flash of colour at first sight produced the effect that a large rocket had been fired off in the vicinity, for it was very similar in colouring and shape to many rockets displayed by pyrotechnists.

Soon after the meteor had disappeared I observed three very faint shooting-stars to fall from a high altitude downwards to the track which the meteor had taken.

I furnish you with these observations, which may interest your readers, especially those who were fortunate enough to observe this splendid phenomenon. ERAS. OMMANNEY

6, Talbot Square, W., July 29

D-line Spectra

LAST March you were good enough to publish in NATURE (vol. xiii., p. 366) a request for some explanation of the extremely different, and indeed opposite, reactions afforded to *boric acid* by the yellow or D-line spectral flame emitted from soda or its salts, and from platinum respectively, when treated with the blowpipe.

No explanation has been vouchsafed; and it may be now added to that fact that, among the millions of substances in nature emitting this D-line producing-flame when heated before a blowpipe, sodium salts are the *only ones* which give the reactions of sodium; all others affording extremely marked reactions of an *exactly opposite* character. W. A. ROSS

July 24

Pyroxidation

WILL any of your chemist contributors be so kind as to afford in your columns an explanation of the following phenomenon?

If we heat before a blowpipe on a piece of aluminium plate (which has a side of four inches perpendicular to the blowpipe flame) a fragment of pure antimony, we have three sublimates deposited on the perpendicular side of the plate in the following order:—

(*a*) Sb_2O_5 (strongly reddening litmus paper) *highest.*
(*b*) Sb_2O_3 (faintly ,, ,, ,, intermediate.
(*c*) A *black* sublimate (?) lowest.

I want to know why a substance similar to another, except that it contains two more atoms of oxygen, and has therefore a higher specific gravity, travels perpendicularly up the plate to a more elevated position? W. A. ROSS

July 24

ABSTRACT REPORT TO "NATURE" ON EXPERIMENTATION ON ANIMALS FOR THE ADVANCE OF PRACTICAL MEDICINE[1]

V.

Results of Experiments on Resuscitation.

IN my last communication I described a method of practical study by experimentation which was intended to demonstrate the best means of restoring to life those human beings who by accident are thrown on the confines of death. To thoughtful and feeling minds this study is sublimely solemn, but I see that a writer in one of the contemporaries of NATURE has found it possible, in his zeal against experimentation on animals, to make my observations on the subject the matter of a jest at my expense. In order to render his jest applicable, the writer has also perverted my statement so as to make a simple illustration of a discovered fact appear as if it were presented in the light of the fact discovered. It will be remembered by the readers of these articles that after I had described, in my last essay, the observations relating to the effect of galvanism on expiring muscular power, I enforced the lesson by illustrating the difference of effect that might be expected to occur from carrying an exhausted animal to a place of succour and of making it travel to the place. The writer I refer to states this illustration as the fact which I have arrived at by experiment, and thereupon founds his joke, which he borrows from *Gil Blas*. The circumstance of this criticism has an interest for which I am thankful. It has suggested to my mind something which might not have occurred to it, viz., that in my desire to be very brief in these abstract reports I have neglected to introduce a few detailed arguments of first importance, which ought not, perhaps, to have been omitted in any case, but which I am now compelled to supply.

After the discovery of the process known as galvanism, and the researches conducted by Galvani, Volta, and Aldini on the influence of the galvanic current on animal life, the application of the current for the purpose of resuscitating persons who were apparently dead became the common practice of medical men. The extraordinary experiments conducted by Aldini at the College of Surgeons during the day of January 17, 1803, on the body of a malefactor named Forster, made an impression on men of science which was probably without parallel. The malefactor, after being hanged and after being exposed for a whole hour to a temperature two degrees below freezing-point, was carried to a house near to Newgate, and, in pursuance of the sentence, was delivered over to the College of Surgeons. The master of the College, Mr. Keate, here re-delivered the body over to Aldini, who was the nephew and devoted follower of Galvani, and the action of the galvanic current upon the dead man was demonstrated. I need not describe minutely the strange phenomena that were observed during the demonstration. Carpue, the anatomist, took share with his pupil Hutchins in the anatomical part; Cuthbertson, an eminent mathematical instrument-maker, the Browning of that day, directed and arranged the galvanic apparatus, which consisted of three troughs of forty elements each; Mr. Keate took duty in observing, and Aldini directed the operations. Fifteen experiments were carried out, and such were the muscular movements excited in the dead man by the current that the most sanguine expectations

[1] Continued from p. 252.